

# Corrigendum: Improved He I Emissivities in the Case B Approximation

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A setup error caused allowed resonance lines to escape via scattering from free electrons. Transitions to the ground state should not escape in the Case-B approximation. The escaping line photons resulted in decreased populations of  $np^1P$  levels, and indirectly decreased populations of other levels (via radiative decays and collisions). This most strongly affected low- $L$  singlet transitions at densities  $\lesssim 10^5 \text{ cm}^{-3}$ .

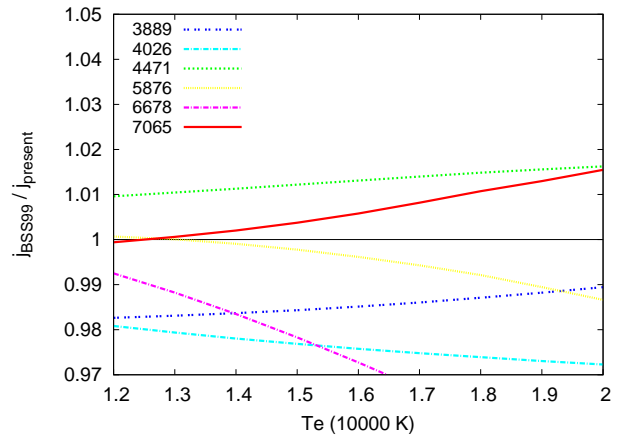
We have turned off the process and recalculated our results. Corrections to lines emitted from  $np^1P$  levels can be more than an order of magnitude, while lines from  $ns^1S$  levels are corrected by up to a factor of  $\sim 2$ . This affected 11 of the 44 lines reported in the supplemental table. Most lines are affected by  $\sim 1\%$  or less. All line emissivities increase (or are negligibly affected) due to this change.

An additional error was the inadvertent disabling of some collisions with  $\Delta n > 5$ . This slowed approach to local thermodynamic equilibrium with increasing temperature or density, but the effects are generally comparable to or less than the uncertainties due to collisional rates. This omission has also been corrected here. Line emissivities can both increase and decrease as a result of this change. The behavior is a function of temperature and density.

Figure 1 pertained only to fundamental data and not the results of simulations. It is unaffected by the error. Figures 2 and 4 are only weakly affected. The identified trends are unchanged and reproducing those figures is unnecessary.

Of the six emissivity ratios in Figure 3, which is re-plotted here, four of them are only weakly affected. The results for  $\lambda\lambda 5876$  and  $6678$  have increased as a result of the changes described here, the latter because its upper level,  $3d^1D$ , is strongly populated by radiative decays from higher  $np^1P$  levels, the former because  $3d^1D$  and  $3d^3D$  are strongly mixed collisionally. These changes are in the same direction but smaller than the ones reported in the original manuscript.

We also compared our new emissivities to the full set of Benjamin, Skillman, & Smits (1999; hereafter BSS99) results at 10,000 K and  $n_e = 100 \text{ cm}^{-3}$ . The largest difference ( $\sim 6\%$ ) is for  $\lambda 17003$  and seems to be directly attributable to different absorption oscillator strengths published by Kono & Hattori (1984) and Drake



**Figure 3.** Ratio of BSS99 and present emissivities for several strong lines as a function of temperature with  $n_e = 100 \text{ cm}^{-3}$ .

(1996). Only 12 of the remaining 32 emissivities differ by more than 1% – the largest by  $\sim 3\%$ . The differences are strongly correlated with differences in recombination coefficients. Much larger differences continue to exist at higher densities and temperatures.

Table 1 contained a line list and associated level designations and does not require corrections. Table 2 and the supplemental table have been updated.

## ACKNOWLEDGMENTS

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**Table 2.** Emissivities of several He I lines at conditions important for primordial abundance analyses. This table is a small subset of the full results. Values are  $4\pi j/n_e n_{\text{He}^+}$  in units  $10^{-25} \text{ erg cm}^3 \text{ s}^{-1}$ .

$T_e$ (K)	$n_e$ ( $\text{cm}^{-3}$ )	3889Å	4026Å	4471Å	5876Å	6678Å	7065Å
10000	10	1.3897	0.2905	0.6105	1.6838	0.4788	0.2876
11000	10	1.2987	0.2655	0.5556	1.5162	0.4306	0.2729
12000	10	1.2201	0.2442	0.5092	1.3767	0.3904	0.2601
13000	10	1.1513	0.2259	0.4695	1.2589	0.3566	0.2488
14000	10	1.0906	0.2100	0.4352	1.1582	0.3277	0.2389
15000	10	1.0365	0.1960	0.4052	1.0712	0.3028	0.2299
16000	10	0.9880	0.1837	0.3788	0.9954	0.2810	0.2219
17000	10	0.9442	0.1727	0.3554	0.9287	0.2620	0.2146
18000	10	0.9044	0.1629	0.3345	0.8697	0.2451	0.2079
19000	10	0.8680	0.1540	0.3157	0.8172	0.2301	0.2017
20000	10	0.8347	0.1460	0.2988	0.7701	0.2166	0.1961
10000	100	1.4005	0.2910	0.6116	1.6872	0.4796	0.2978
11000	100	1.3115	0.2661	0.5571	1.5240	0.4326	0.2850
12000	100	1.2349	0.2449	0.5113	1.3889	0.3938	0.2741
13000	100	1.1681	0.2268	0.4722	1.2755	0.3614	0.2644
14000	100	1.1092	0.2111	0.4385	1.1792	0.3338	0.2559
15000	100	1.0568	0.1973	0.4091	1.0964	0.3102	0.2482
16000	100	1.0098	0.1851	0.3833	1.0245	0.2898	0.2411
17000	100	0.9673	0.1743	0.3604	0.9616	0.2720	0.2347
18000	100	0.9286	0.1647	0.3401	0.9061	0.2563	0.2287
19000	100	0.8933	0.1560	0.3218	0.8571	0.2424	0.2233
20000	100	0.8609	0.1481	0.3054	0.8133	0.2300	0.2183
10000	1000	1.4732	0.2939	0.6206	1.7530	0.4969	0.3759
11000	1000	1.4004	0.2700	0.5698	1.6164	0.4576	0.3775
12000	1000	1.3393	0.2501	0.5279	1.5090	0.4269	0.3793
13000	1000	1.2868	0.2333	0.4930	1.4233	0.4027	0.3808
14000	1000	1.2408	0.2189	0.4635	1.3540	0.3835	0.3815
15000	1000	1.1998	0.2064	0.4382	1.2970	0.3680	0.3814
16000	1000	1.1627	0.1955	0.4164	1.2493	0.3554	0.3804
17000	1000	1.1285	0.1859	0.3973	1.2086	0.3448	0.3785
18000	1000	1.0969	0.1775	0.3805	1.1740	0.3359	0.3762
19000	1000	1.0678	0.1700	0.3659	1.1457	0.3284	0.3745
20000	1000	1.0405	0.1632	0.3528	1.1206	0.3217	0.3721

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